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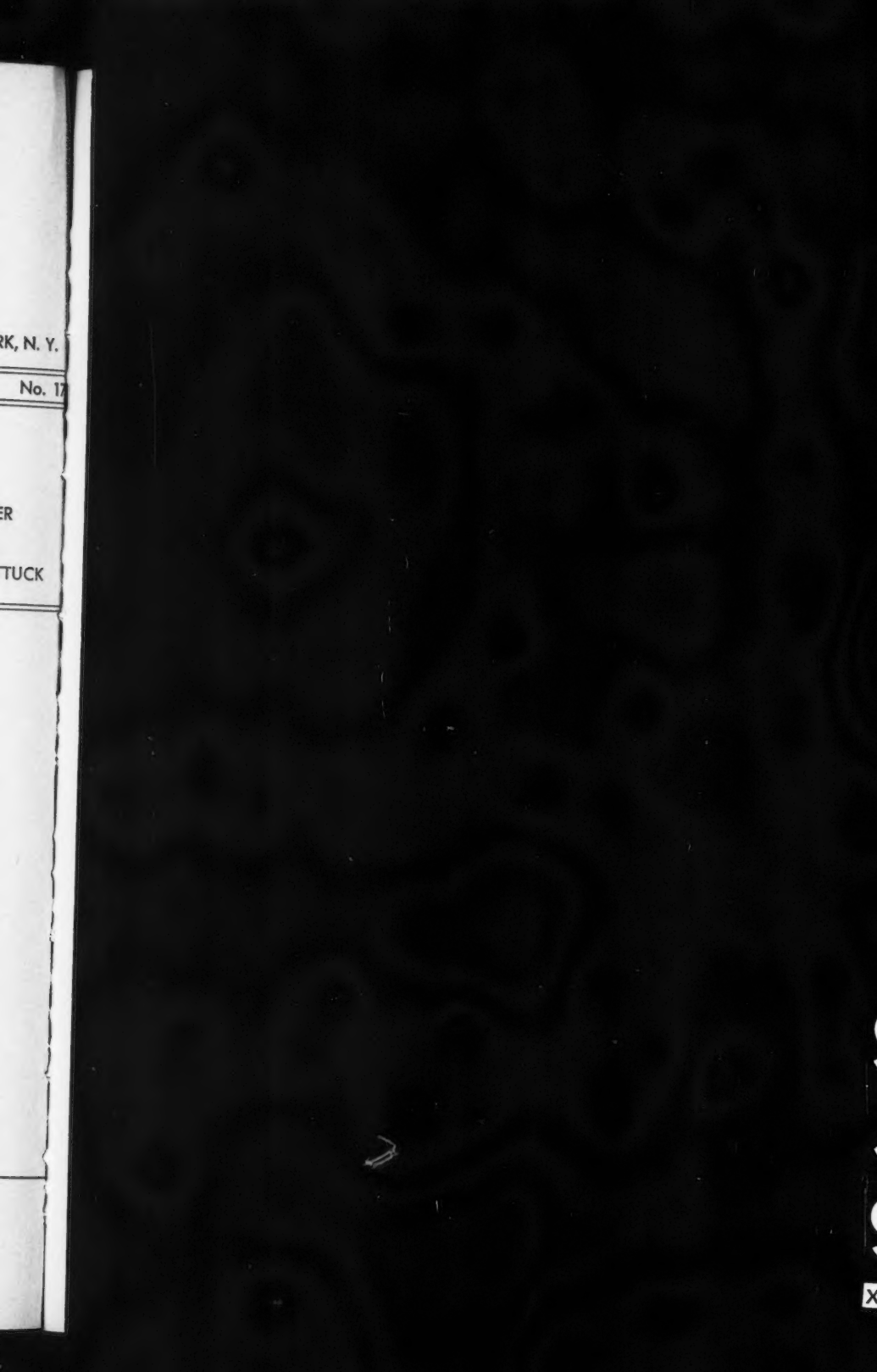
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189. MEASURING THE HAZARDS ON RURAL HIGHWAYS, J. T. Hallett. (Civil Engineering, September 1939)

This article is in two parts: (a) Percentage and Severity of Various Types of Accident; and (b) Relation of Accidents to Traffic Volume. We have given here a digest of "a" and the tables which accompany both "a" and "b".

"Intersectional friction" is evidenced by collisions at intersections, and accounts for 18.9 per cent of all accidents reported on these highways for the period of study. Intersectional accidents were 34.5 per cent at night vs. 49.5 per cent at night for all accidents; 2 per cent were fatal vs. 3.9 per cent fatal for all accidents; and property damage reported was $133 per accident vs. $165 for all accidents.Since only 30 per cent of state highway traffic is at night, these data indicate that driving at intersections is only slightly more hazardous by night than by day and that, in general, the ratio of night to day hazards is lower at intersections than at other places on the highways.

"Medial friction" is evidenced by collisions at or near the center of pavements by vehicles going in opposite directions, usually resulting in a head-on or side-swipe, and accounts for 28.9 per cent of all accidents. Of the medial friction accidents,55.9 per cent occurred at night as against 49.5 per cent at night for all accidents; 4.6 per cent were fatal vs. 3.9 per cent fatal for all accidents; and there was $212 property damage per accident vs. $165 property damage per accident for all. These data indicate that the hazards for night traffic are greater at the center of the road than at other places and the accidents there are considerably more severe.

TABLE I. Accidents on 3,500 Miles of State and Federal Highways (Rural) in Indiana
July 1, 1937, through June 30, 1938, By Type

MAJOR TYPES	Total Fatalities	Total Persons Injured	Total Property Damage
Intersectional Friction	28	761	$143,523
Medial Friction	108	1,463	347,719
Internal Stream Friction	37	1,011	216,096
Marginal Friction	53	767	173,794
Pedestrian	35	108	1,859
Others	14	28	21,412
TOTAL	275	4,138	$904,403

"Internal stream friction" is evidenced by collision of cars going in the same direction but at different speeds, or hitting a parked car on the pavement headed in the same direction, and accounts for 28.6 per cent of all accidents. Internal stream accidents were 50.4 per cent at night vs. 49.5 per cent at night for all accidents; 2 per cent fatal vs. 3.9 per cent fatal for all accidents; and there was $133 property damage per accident vs. $165 property damage per accident for all accidents. These data indicate that the hazard per traffic unit is higher at night than by day, but is about average or normal for all accidents.

"Marginal friction" is evidenced by collision with cars parked along the shoulder, poles, ditches, rough shoulders, etc., and accounts for 20.4 per cent of all accidents. Of the marginal friction accidents 50.5 per cent were at night vs. 49.5 at night for all accidents; 4 per cent were fatal vs. 3.9 per cent fatal for all accidents; and there was $150 property damage per accident vs. $165 property damage per accident for all accidents. Thus the percentage of marginal friction accidents is only slightly higher at night than the average, but considerably higher per unit of traffic than by day.

The pedestrian accidents as a whole were only 2.4 per cent of all, but there were more "fatals" in this group than in either the intersectional or internal stream classifications. Railroad crossing accidents are only 0.4 per cent of all. The percentage of fatalities is high but the number is less than that caused by any of the other frictions."Mechanical defects" includes only 0.4 per cent of all accidents.

TABLE II. Section 2. Accident Rate Per Million Vehicle Miles

	Inter-sectional	Medial	Internal Stream	Marginal	Total
2-Lane Roads					
Less than 500	0.613	0.788	0.481	0.460	3.342
500 to 1,000	0.436	0.781	0.634	0.690	2.541
1,000 to 2,000	0.452	0.653	0.683	0.543	2.331
2,000 to 3,000	0.459	0.915	0.802	0.558	2.734
3,000 to 4,000	0.484	0.950	0.704	0.579	2.717
Over 4,000	0.416	0.652	0.779	0.417	2.264
All 2-Lane	0.460	0.793	0.718	0.561	2.532
3-Lane Roads	0.600	0.765	1.070	0.324	2.759
4-Lane Undivided	0.746	0.429	0.936	0.433	2.544
4-Lane Divided	0.485	0	0.754	0.485	1.724

190. PENNY PARKING PAYS, Philip T. Smith, Chief of Police, New Haven, Connecticut. (American City, Sept. 1939).

New Haven,Connecticut is the only city in the United States, as far as I know, operating penny parking meters. We have 397 of them in our central business district, and the rate is one cent for fifteen minutes and two cents for thirty minutes. These meters have had three big results: (1) they have cleared up congestion, removed the all-day parker, eliminated double parking, speeded up traffic flow and permitted me to discontinue a special squad formerly maintained to clear congestion from 4:00 to 6:00 P.M.;(2) they received instantaneous approval from motorists, Banks, merchants and taxpayers, and I have been unable to locate a single dissenter;(3) they are more than paying their cost, with a total revenue of $1,920.68 for the first four weeks (24 operating days), or 20.128 cents per meter per operating day, which means an average turnover of at least ten-cars per space.I happen to know that at one location the meters are earning 32 cents per day, which means a minimum turnover of 16 cars. Observations have been reported of six or seven cars using the same penny's worth of time, and at noon on one block eight spaces were found vacated with 6 to 25 minutes available on the meters.

The curbs were congested with long-time parkers,many of them merchants and store employees, who have since seen the shortsightedness of occupying the places of prospective customers, prior to the installation of parking meters. Double parking, cruising and fender-denting maneuvering were common practices difficult and often impossible to cope with. Efforts to regulate the mess produced no lasting improvement. It would have taken all the time of ten men to enforce the quarter-, half-, and one- and two-hour regulations.

Our motive obviously was not to make money but (1) to bring order out of chaos and (2) to facilitate the transaction of business.

191. RELATIONSHIP OF AERIAL MAPPING TO HIGHWAY ENGINEERING, J. S. Carpenter, Senior Highway Engineer, U. S. Bureau of Public Roads. (Roads and Streets, August 1939)

Complete and accurate aerial maps may be used for planning of systems of highways. Detailed location of individual routes in any system of highways will be materially aided by good topographic maps. The actual location of these routes is ordinarily left to an instrument man who develops the alignment that topography seems to dictate. With complete maps this development can be projected by more experienced engineers and checked in the control office by experts who have had long experience in highway location. It is conceded by some highway engineers, who have given careful study to the subject that

route maps can be prepared from good aerial maps supplemented by the aerial photographs of the area under consideration.

Plans for construction can not be prepared from aerial maps without field surveys, but these maps provide excellent supplemental data for use in the design which ordinarily can not be obtained without surveys of such extent that the cost is considered prohibitive. On accurate topographic maps the area of a water shed, its shape, the slopes of the land, character of vegetation and land use can be determined. Development of this information for a number of drainage areas will allow the intelligent evaluation of our present practice of determining required areas of drainage openings and the revision of these practices to insure economy in construction and safety for the structures. Another use of good maps is in the study of the availability of local materials for surfacing, for concrete structures and the development of economy in haul of these materials.

There are three distinct procedures involved in modern mapping: 1. Ground control. 2. Flying and photography. 3. Projection of planimetric data, development of the contours and printing of the finished maps.

192. SOMETHING OF A RECORD, Editorial. (Engineering News-Record, August 17, 1939).

An unusual safety performance has been made by the Merritt Parkway, Connecticut's 20 mile express highway. A week ago, after more than 13 months operation, it reported its first fatal accident. High speeds prevail on the parkway, as it is posted for 50 miles per hour,end the traffic is far from light, having averaged nearly 20,000 vehicles per day during the last two months, or 5,000 per lane, with maxima of nearly 3,000 vehicles per hour for the four lanes. These are conditions that usually lead to a substantial accident rate; yet prior to the recent fatal accident (a driver fell asleep and ran off the roadway into a tree)only ordinary light accidents had occurred. We believe this is the first high-speed trunk road of heavy traffic that has made so good a safety record. Evidently the safety elements built into the Merritt Parkway are effective: well separated roadways, good alignment and sight distance, ample widths and safe curbs.

193. IS DIVERSION A MENACE OR A MYTH? Hawley S. Simpson, Research Engineer, American Transit Association. (Civil Engineering, September 1939)

Current propaganda against the evils of diverting special highway revenues for other than highway purposes, culminating

in restraining legislation by federal government and prohibitory constitutional amendments in several states, has reached such a pass that the average motorist has become convinced he is being subjected to highly discriminatory taxation.

That there has been a substantial diversion of state motor vehicle tax revenues cannot be questioned. As states began to realize that here was an easily tapped source of funds for financing essential state functions other than highways, the practice increased until in 1937 over 160 million dollars was diverted. This represented 14 per cent of all state gasoline taxes, registration fees, and special motor taxes, after deducting administrative expenses.

MOTORIST NOW PAYS FAIR SHARE - It is proper to question whether this is a sound basis for calculation. Standards of living have increased measurably since 1904. Would the public now be satisfied with the mud roads of 35 years ago? Nothing else that was acceptable to us in 1904 finds much favor today. Furthermore, highway construction costs have risen greatly in this period; thus the highway dollar today buys less comparable roadway than at the turn of the century. So we may reasonably expect that the public now would be willing, and would have to spend per capita many more present-day dollars than in 1904 to provide a satisfactory street and highway system even if there were no automobiles.If we assume a per capita expenditure even twice that in 1904, general taxation for highway purposes should have contributed in 1937 about 820 million dollars. The motorist's share of the 1937 expenditures would, then have been about 1,350 million. This is about 150 million dollars less than the total of special motor vehicle imposts in that year.

Apparently, then, the motorist is being neither unfairly treated nor subsidized. It cannot be said, on the basis of the data available, that he has failed to pay approximately all, if not more than all, of street and highway construction and maintenance costs that are fairly chargeable to the users.

194. ON ESTIMATING STREET TRAFFIC BY MEANS OF EXTREMELY SHORT COUNTS. C. W. Vickery, Ph.D., Chief Statistician, Texas Highway Planning Survey.

If instead of counting traffic continuously at a given point for a period of 4 hours, we were to count for four 1-hour periods spaced at equal intervals over the day, we should obtain a much more reliable estimate of the traffic volume and other characteristics. However, even if it were found that from the same expenditure of money, only three, or even two, 1-hour-counts could be obtained, one might expect the results to be more reliable than a continuous 4-hour count, provided the

counts are spaced at equal intervals over the day. As a matter of fact, we could do even better than that. Instead of taking a continuous 1-hour count, we may restrict the continuous counts to periods of 15 minutes, 10 minutes, or even 1 minute. The thing of importance is not so much the total time during which traffic is counted at a point, but the distribution of the counts over the entire day.

About the simplest of all quadrature formulas is the trapezoidal rule. Suppose that we have a series of twenty-five counts, each of duration 1 minute, and spaced 1 hour apart from center to center. It is immaterial whether the counts are made on the hour, just so they are spaced 1 hour apart. The trapezoidal rule tells us that to estimate the total traffic for the 24-hour day, we take the average of the first and last-counts, to this add the sum of the remaining 23 counts, and multiply by 60, this being the number of minutes in an hour. If the counts had been for periods of 5 minutes each, we should first have divided each count by 5 in order to reduce the count to density per minute. This procedure enables us to make use of counts of different durations taken at the same point.

Errors of chance variation in this method result from the fact that the traffic does not flow continuously like a stream. Except under conditions of extreme congestion, traffic tends to come in bunches. The result is that if we take several 1-minute counts during the same hour,we would not obtain the same number of vehicles during each minute. In fact, thay may vary considerably. Furthermore, the shorter the counts that are taken within the hour, the greater this variability is liable, to be. Thus, in shortening the counts and spacing them at intervals over the day, we lessen the reliability of each particular count, but increase the reliability of the estimate of the traffic for the whole day. The spacing of counts over the day reduces the errors due to variations of the traffic from hour to hour. While it increases the variability of any one of the short counts, the increase in the number of the counts that are taken is a compensation.

NOTE: Anyone interested in obtaining a copy of this paper by Dr. Vickery (of which this article is a digest) may do so by writing in to the Institute headquarters.

195. MUNICIPAL TRAFFIC PROBLEMS ON STATE ROUTES IN INDIANA. John B. Moriarty, Traffic Engineer, State Highway Commission of Indiana. (American City, Sept. 1939)

One of the most evident needs in traffic control is the use of standardized traffic-control devices and regulations which have the same meaning in any city or state. National and state manuals have been prepared to promote such uniformity. However, the multitude of local governmental agencies, each responsible

for the control of traffic within its area, has resulted in such a variety of ideas and practices that present-day efforts in this direction have merely scratched the surface.

When the Indiana State Highway Commission took over the maintenance of state routes through cities the administration of the responsibility of traffic control on these city streets offered an excellent opportunity for making long strides toward standardization and uniformity of traffic regulations throughout the state. The first objective was the standardization on those streets under Commission jurisdiction; the second was to encourage cities to adopt the same standards for the streets under their local jurisdiction.

TRAFFIC SIGNALS - There are at present 589 signalized intersections on the Indiana state highway system outside the city of Indianapolis, representing an investment of several hundred thousand dollars. A survey, 65 per cent complete, shows the following conditions:

1. One out of every four installations is unwarranted; this estimate is based on warrants approximately one-half of those outlined in the national Manual of Uniform Traffic Control Devices. Based on the full warrants as set out in this manual, four out of five of these intersections would not warrant signalization.
2. Four out of every five installations are substandard, in some respects conducive to increased hazard and inconvenience.

PARKING - In the opinion of the writer, one of the most dangerous and most uneconomical practices in the use of our street systems today is the general laxity of design, application and enforcement of parking regulations. One car parked too close to a corner may transform that corner from a safe intersection with adequate sight distances to a potential hazard at the approach of every vehicle on the cross-street. One car double parked may transform the movement of traffic within a whole city block from an orderly stream of traffic to a snarl of congestion, with its attendant loss of time, money, safety, and patience.

SPEED ZONES - Every cross-country driver is familiar with the following type of sign at the city limits of many cities and towns--"Speed Limit 15--Enforced." Such a sign defeats its purpose, because it is very evidently unreasonable in the first place, and bluff in the second place.

In order to establish uniformity of application of the various speed limits, the following definitions are applied to all proposed speed zones on the state highway system: (1) 20 mph zones shall be established where at least 50 per cent of the

frontage (including both sides of the street) for a distance of 500 feet or more, measured along the centerline of the street, is occupied by buildings in use for business; (2) 30 mph zones shall be established in locations outside of 20 mph zones where the total frontage on both sides of the street is occupied by residences or residences and business buildings under 100 feet apart. To determine such a zone, divide the number of front feet by the number of houses on the block; (3) 40 mph zones shall be established in locations not covered by 20- and 30-mph zones where the total frontage on both sides of the street is occupied by residences or residences and business buildings more than 100 feet and less than 300 feet apart.

The above definitions may be complicated by intersecting roads or streets carrying heavy traffic, by school buildings, factories and other special conditions. These conditions must be weighed in the field and adjustments made accordingly.

196. MICHIGAN CONSIDERS MINIMUM SPEED. (Better Roads, September 1939).

A study of the advisability of imposing a minimum speed on state trunk-line highways in Michigan has been ordered by Murray D. Van Wagoner, state highway commissioner.

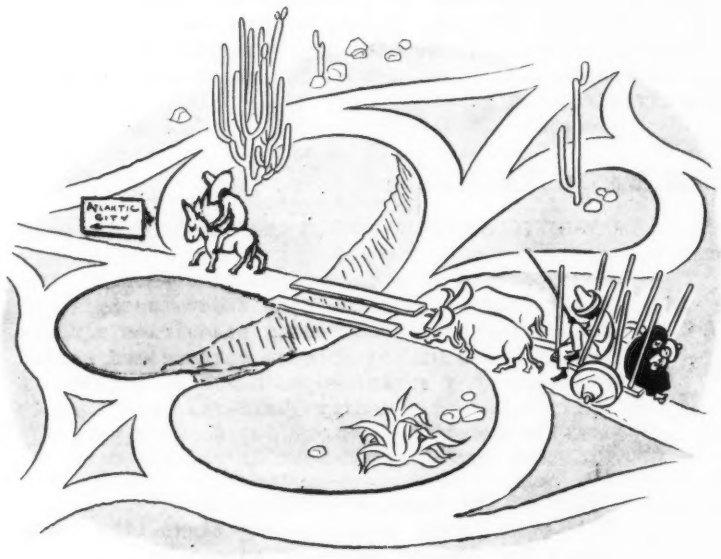
"I am convinced that the 'snail' drivers on highways have become nearly as dangerous as the speeders," he said in discussing the problem. "They hold up traffic with a definite objective when they dawdle along the highways. We have no money to build wider roads to take care of the resulting traffic jams.

"Drivers annoyed at being held up behind slow-going motorists become impatient and decide to 'run the gantlet' to get out in front. That's when accidents happen."

Commissioner Van Wagoner mentioned 30 mph as a possible minimum speed to be enforced on express highways, He suggested to the state highway planning survey that a study be made to determine the danger created by slow drivers on holiday week-ends and he said it might be advisable to experiment on a few trunk-line highways to determine the effectiveness of a minimum-speed regulation. The first experiments might be made on week-ends.

ALL PATHS LEAD TO THE ITE CONVENTION, The Program Committee reports that all the details are completed for the Tenth and greatest convention ever held by the Institute. Although a copy of the complete program will be mailed to all Institute members within a few days, we cannot help but give you the names of the leading traffic and highway officials who will participate, in order of their appearance on the program.

Murray D. Van Wagoner, State Highway Commissioner, Lansing, Michigan
John E. Furlong, State Traffic Engineer, Denver, Colorado
Ernst Lieberman, Chief Highway Engineer, Springfield, Illinois
Leslie J. Sorenson, Traffic Engineer, Chicago, Ill.
Arnold H. Vey, State Traffic Engineer, Trenton, N.J.
Maxwell N. Halsey, Associate Director, Bureau for Street Traffic Research, Yale University
Otto K. Jelinek, Traffic Engineer, Chicago Park Dist. Chicago, Illinois
Edgar F. Copell, Traffic Engineer, Boston, Mass.
Harry H. Harrison, State Traffic Engineer, Springfield, Illinois



Convention Caravan Gets Under Way

D. Grant Mickle, Director, Traffic & Safety Division, State Highway Department, Lansing, Michigan
Wilbur S. Smith, State Traffic Engineer, Columbia, South Carolina
Charles M. Noble, Special Highway Engineer, Pennsylvania Turnpike Commission, Harrisburg, Pa.
Harold F. Hammond, Director, Traffic Division, Nat'l Conservation Bureau, New York, N.Y.
Robert A. Mitchell, Traffic Engineer, Philadelphia, Pennsylvania
T. Elmer Transeau, Director, Bureau of Highway Safety, Harrisburg, Pennsylvania
Harry E. Stedman, Safety Engineer, Des Moines, Iowa
Louis J. Schrenk, General Superintendent, Public Lighting Commission, Detroit, Michigan
Thomas J. Seburn, Traffic Engineer, Kansas City, Mo.
William R. McConochie, Traffic Engineer, Chicago Surface Lines, Chicago, Illinois
Harry C. Koch, Assoc. Traffic Engineer, Detroit, Mich.
Thomas W. Rochester, Chief Engineer, New York, N.Y.

We have been very fortunate in securing Mr. L. A. Hawkins, Executive Engineer, General Electric Research Laboratory, Schenectady, New York, to speak at our Annual Banquet.

CONVENTION COMMITTEE MEETINGS. A special day has been set aside for meeting of committees.The convention is opening a day earlier this year to take care of committee meetings. It is hoped and expected that if your committee chairman calls a meeting for Saturday Afternoon, October 14, you will be on hand. The committee responsibilities are an important part of our Institute activities.

CATS AND TRAFFIC ENGINEERS.

A TRAFFIC ENGINEER SOLVES ANOTHER PROBLEM!

Four persian cats on a dead-end street
Along came an auto and went tweet-tweet.
The car brakes screeched; a pedestrian squealed;
And the fate of the persian cats seemed sealed.
But away they scrambled as quick as a ghost
And perched on a nearby guard-rail post.
Now the question I ponder is, as they sat,
Did they save the motorist or he, the cat?

"Slow -- Cat Zone -- Caution Please"
With nine lives to spare, why signs like these?
"Dead End Street" is plain as can be
And we'll all avoid a cat-astrophe.

This poem by Mr. Rufus G. Jasper was inspired by some correspondence between Mr. J. W. Arch Bollong, one of our West Coast members, and a gentleman, the owner of four persian cats. The original letters are so good, we cannot help but quote a few lines from each.

The Gentleman to Mr. Bollong: "The undersigned requests the permission to erect at his own expense a highway safety sign... Such a sign would conform to standard requirements save for the legend 'SLOW - CAT ZONE.' Four felines of Persian extraction and pedigree...have graciously condescended to use as their playground that section...Inasmuch as the decision of a Persian is tatamount to a Royal Edict; and since the lives of these aristocratic mousers are daily jeopardized by a horde of plebian motorists, the necessity for such a sign cannot be overemphasized...It would safeguard 36 lives (nine per cat)..."

Mr. Bollong to the Gentleman: "We are duly appreciative of the lives, habits and instincts of the feline family of Persian origin and believe they should be granted that courtesy of the Medes and Persians in exclusive use of the playground that they have chosen. Royalty should be served."

MICHIGAN ADOPTS A NEW MODEL TRAFFIC CODE. On Friday, September 29, Michigan adopted a new traffic code which eliminates many antiquated laws and clarifies others. The Michigan State Highway Department and State Police Department took the lead in the preparation of the code and had the cooperation of the City Police and Sheriff Departments. Some of its features are:

The law prohibits right turns against red lights, unless specifically permitted with proper posting.

Speed limits in business districts are increased from 15 to 20 miles an hour with a maximum of 25 miles an hour in residential districts.

Make it mandatory for pedestrians to walk toward traffic where no sidewalks are provided and it is customary to walk on paved roads.

Pedestrians must obey traffic lights. Unless the signal is equipped with a "walk" lens, he must cross the street only on the green light.

TURNPIKE NEWS. The Pennsylvania Turnpike Commission is now issuing a monthly bulletin, TURNPIKE NEWS. This publication contains all news of the engineering, construction, administrative and personal aspects of this great engineering feat, "The Dream Highway." If anyone is interested in receiving a copy, he may write to the Pennsylvania Turnpike Commission, Harrisburg, Pennsylvania.

TO THE CONVENTION. The Pennsylvania Railroad offers attractive roundtrip fares to New York incident to the New York World's Fair, and on tickets reading through Philadelphia either going or returning you can take in Atlantic City for an additional charge of $2.00 in coaches and $3.00 in Pullmans. Consult your local ticket agent for further information.

UNITED STATES CIVIL SERVICE EXAMINATIONS. The United States Civil Service Commission announces open competitive examinations for: Principal Transportation Economist, Senior Transportation Economist, Transportation Economist, Associate Transportation Economist, Assistant Transportation Economist. Applications must be on file with the Commission not later than October 16. The necessary forms may be obtained from the Secretary, Board of United States Civil Service Examiners, at any first-class post office or from the Civil Service Commission.

SAFETY WORK IN THE STATE OF MAINE. A letter from Ralph Sawyer, State Traffic Engineer, Augusta, Maine, informs us that: "You might be interested to hear that the State has recently appointed Charles Jortberg of Portland as Executive Secretary of the State Coordinating Committee which will be to the promotion of all types of safety, especially on the highways. The same Council Order carried a budget appropriation of $5,000 with which to carry on the work. All of us connected with safety.... feel that this is a very forward step in the promotion of safety work in the State of Maine."

LOUIS E. RENDER. Mr. Louis E. Render, Assistant Engineer of Maintenance, State Highway Commission of Indiana, has taken a year's leave of absence to attend the Yale Bureau for Street Traffic Research as a fellow.

A. G. STRAETZ. Mr. A. G. Straetz informs us that he is now sales engineer with the Kopp Glass, Inc. in Chicago, Illinois.

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THE OBJECTIVES OF THE INSTITUTE

The objects of the Institute shall be the advancement of the art and science of traffic engineering, the fostering of traffic engineering education, the stimulation of original research in traffic engineering, the professional improvement of its members, the encouragement of intercourse between men with mutual interests in traffic engineering, and the establishment of a central point of reference and union for its members. (Article I, Section 4 of the Constitution of the INSTITUTE OF TRAFFIC ENGINEERING).

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